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ELGO ELECTRONIC

Operation Manual

SERIES *P40-000*

Programmable controller

- LCD Display
- Simple handling
- Manual function
- Single set operation
- Program memory
- Digital outputs
- Analogue output

Translation of original User Manual

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1 Content

1 Content 3

2 General 5
2.1 Information Operating Manual 5
2.2 Terms and Abbreviations 5
2.3 Explanation of Symbols 6
2.4 Statement of Warranties 7
2.5 Demounting and Disposal 7

3 Safety 8
3.1 General Causes of Risk 8
3.2 Personal Protective Equipment 8
3.3 Conventional Use 9

4 Transport and Storage 10
4.1 Safety Instructions for Transport, Unpacking and Loading 10
4.2 Handling of Packaging Material 10
4.3 Inspection of Transport 10
4.4 Storage 10

5 Product Features 11

6 Technical Information 12
6.1 Identification 12
6.2 Dimensions 12
6.3 Technical Data 12

7 Design und Function 14
7.1 Function of keys 14

8 Operation and Operation Modes 16
8.1 Operation Modes 16
8.2 Referencing 19

9 Installation and First Start-Up 20
9.1 Operating Area 20
9.2 Mounting / Installing 21
9.1 Activation of the device 21

10 Menu Structure, Sections and Parameters 22

11 Menu Axis 23
11.1 Menu Axis - Distances 23
11.2 Menu Axis - Times 28
11.3 Menu Axis - Analog 30
11.4 Menu Axis - Settings 33

12 Menu System 40
12.1 Menu System – Setup 40
12.2 Menu System – Times 43
12.3 Menu System – I/O Configuration 44

13 Menu Password 49

14 Menu Diagnosis / Error Messages 50
14.1 Menu Diagnosis 50
14.2 Error Message 50

15 Menu Contrast 51

16 Parameter Table 52

17 I/O Configuration Table 56

18 Pin Assignment 58
18.1 Overview connector pin assignment 59
18.1 Connection Example 61

19 Disturbances 62
19.1 Fault Clearance 62
19.2 Re-Start after Fault Clearance 63

20 Accessory 64

21 Maintenance 65

22 Cleaning 65

23 Type Designation 66

24 Index 67

2 General

2.1 Information Operating Manual

This manual contains important information regarding the handling of the device.
For your own safety and operational safety, please observe all safety warnings and instructions.

Precondition for safe operation is the compliance with the specified safety and handling instructions.
Moreover, the existing local accident prevention regulations and the general safety rules at the site of operation have to be observed.

Please read the operating manual carefully before starting to work with the device!
It is part of the product and should be kept close to the device and accessible for the staff at any time. The illustrations in the manual are for better demonstration of the facts. They are not necessarily to scale and can slightly differ from the actual design.

2.2 Terms and Abbreviations

Table 1 Abbreviation

Abbreviation/ Term	Explanation
NC	Not connected

2.3 Explanation of Symbols

Special notes in this manual are characterized by symbols.
The notes are introduced by signal words which express the magnitude of danger.
Please follow this advice and act carefully in order to avoid accidents and damage and injuries.

Warning notes:

	DANGER! This symbol in connection with the signal word "Danger" indicates an immediate danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	WARNING! This symbol in connection with the word „Warning" means a possibly impending danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	CAUTION! This symbol in connection with the signal word "Caution" indicates a possibly dangerous situation. Failure to heed these instructions can lead to minor injuries or damage of property.

Special safety instructions:

	DANGER! This symbol in connection with the signal word "Danger" indicates an immediate danger for the life and health of persons due to voltage. Failure to heed these instructions can result in serious damage to health and even fatal injury. The operations may only be carried out by a professional electrician.

Tips and recommendations:

	NOTE! … points out useful tips and recommendations as well as information for an efficient and trouble-free operation.

References:

(☞ 1.2) Marks a reference to chapter 1.2 of this manual.
(🕮 DOC 3.4) Marks a reference to chapter 3.4 of the document *DOC*.

2.4 Statement of Warranties

The statement of warranties is enclosed separately in the sales documents.

Guarantee
The producer guarantees the functional capability of the process engineering and the selected parameters. The period of warranty is one year and begins with the date of delivery.

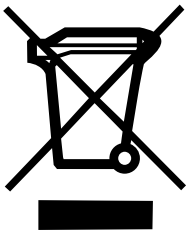
2.5 Demounting and Disposal

Unless acceptance and disposal of returned goods are agreed upon, demount the device considering the safety instructions of this manual and dispose it with respect to the environment.

Before demounting:
Disconnect the power supply and secure against re-start. Then disconnect the supply lines physically and discharge remaining energy. Remove operational supplies and other material.

Disposal:
Recycle the decomposed elements:

- Metal components in scrap metal
- Electronic components in electronic scrap
- Recycle plastic components
- Dispose the remaining components according to their material consistence



CAUTION!
Wrong disposal causes environmental damages!
Electronic scrap, electronic components, lubricants and other auxiliary materials are subject to special refuse and can only be disposed by authorized specialists!

Local authorities and waste management facilities provide information about environmentally sound disposal.

3 Safety

	CAUTION! Please read the operating manual carefully, before using the device! Observe the installation instructions! Only start up the device if you have understood the operating manual. The operating company is obliged to take appropriate safety measure. The initial operation may only be performed by qualified and trained staff.

3.1 General Causes of Risk

This chapter gives an overview of all important safety aspects to guarantee an optimal protection of employees and a safe and trouble-free operation.
Non-observance of the instructions mentioned in this operating manual can result in hazardous situations.

3.2 Personal Protective Equipment

Employees have to wear protective clothing during the installation of the device to minimize danger of health.

Therefore:
Change into protective clothing before performing the works and wear them throughout the process.
Additionally observe the labels regarding protective clothing in the operating area.

Protective clothing:

	PROTECTIVE CLOTHING … is close-fitting working clothing with light tear strength, tight sleeves and without distant parts. It serves preliminarily for protection against being gripped by flexible machine parts. Do not wear rings, necklaces or other jewellery.
	PROTECTIVE GLOVES … for protecting the hands against abrasion, wear and other injury of the skin.
	PROTECTIVE HELMET … for protection against injuries of the head.

3.3 Conventional Use

The ELGO-Positioning Controller is only conceived for the conventional use described in this manual.

The device type *P40- ELGO-* Positioning Controller only serves positioning (distances).

CAUTION!
Danger through non-conventional use!

Non-intended use and non-observance of this operating manual can lead to dangerous situations.

Therefore:

- Only use the device as described
- Strictly follow the instructions of this manual

Avoid in particular:

- Remodelling, refitting or changing of the construction or single components with the intention to alter the functionality or scope of the device.

Claims resulting from damages due to non-conventional use are not possible.
Only the operator is liable for damages caused by non-conventional use.

4 Transport and Storage

4.1 Safety Instructions for Transport, Unpacking and Loading

CAUTION!
Transport the package (box, palette etc.) professionally.
Do not throw, hit or fold it.

4.2 Handling of Packaging Material

Notes for proper disposal: ☞ 2.3

4.3 Inspection of Transport

Check the delivery immediately after the receipt for completeness and transport damage.
In case of externally recognizable transport damages:

- Do not accept the delivery or only accept under reserve.
- Note the extent of damages on the transportation documents or delivery note.
- File complaint immediately.

NOTE!
Claim any damage immediately after recognizing it. The claims for damage must be filed in the lawful reclaim periods.

4.4 Storage

Store the device only under the following conditions:

- Do not store outside
- Keep dry and dust-free
- Do not expose to aggressive media
- Protect from direct sun light
- Avoid mechanical shocks
- Storage temperature (☞ 6.3 Technical Data) needs to be observed
- Relative humidity (☞ 6.3 Technical Data) must not be exceeded
- Inspect packages regularly if stored for an extensive period of time (>3 months)

5 Product Features

The positioning controller of *P40* series is applicable to easy positioning tasks. An important feature is the easy structured function menu. It allows a quick and comfortable setting of the target value, if necessary a specific quantity of desired pieces.
Target and actual value of the axes plus quantity will be displayed on the front panel. The keyboard is simple and user-friendly. With the keyboard the target and the actual value can be forced and the positioning can be started.

The *P40* series has an internal program memory for up to 1000 lines. For the positioning two different kinds of output signals are available: Switch mode positioning and PID-analogue output.

The *P40* series can alternatively be supplied with 24VDC.

Overview of essential features:

- Single or Two Axis-Controller
- Analogue or digital outputs for 1 - 3 speed operation
- 16 free programmable digital in-/outputs (optional 8 digital in-/outputs)
- Program memory for up to 1000 sets

Grundbetriebsarten:

The ***P40*** consists of three general operation modes:

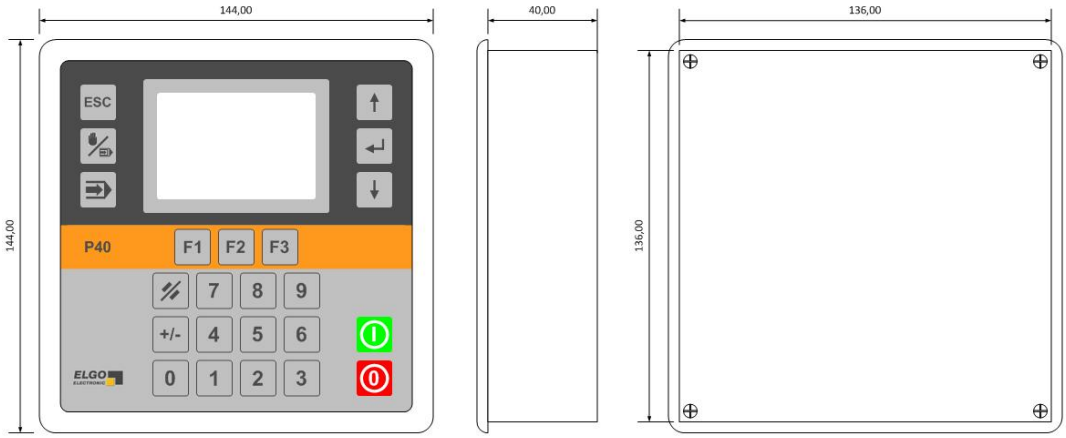
Manual:	Inching operation moves the single axes manually by operating the keypad.
Single:	A whole set can be processed.
Program:	In the program mode data sets can be strung together or programmed. This set of records is then processed sequentially. The program consists of several different data sets.

6 Technical Information

6.1 Identification

The type label serves for the identification of the unit. It is located on the housing of the positioning controller and gives the exact type designation.
When corresponding with ELGO always indicate this data.

6.2 Dimensions



6.3 Technical Data

Table 2 Technical Data

P40 Elgo-Positioning Controller	
Input supply voltage	24 VDC +10/-20%
Power consumption	+24 VDC; max. 150 mA (no-load condition)-permitted current on all consumer (incl. own consumption) is 1A
Rotary encoder supply unit	24 VDC (optional 5VDC); max. 130 mA
Analogue input (optional)	12 Bit resolution at 3,3 V Supply measuring system
Input signals	The Pin assignment of the inputs and the input logic (high/low active) are programmable. Minimum pulse duration: 300 ms Input voltage/Pin: max. 10 mA
Output signals	The Pin assignment of the outputs and the output logic (high/low-active) are programmable (PNP). Permissible output voltage: max 150 mA per output / 500 mA total voltage via all outputs Free wheel control: is integrated for inductive load (clamps voltage at the output max. -45V) Outputs are permanent short circuit (no multiple shorts possible)
Actual value memory	E^2 Prom Durability: 10^5 On-Off-Switch-Cycles or 10 years
Connection technology	Industry standard connectors (3,81mm grid, lockable)
Display	LCD Dot-Matrix 120 x 80 pixel with white backlight

P40 Elgo-Positioning Controller	
Hardware	32-Bit-Microprocessor with 1 MByte Flash 56 Kbyte RAM
System accuracy	+/ -1 Increment
Input frequency	100 kHz
Front cover dimensions	W x H = 144 mm x 144 mm
Disruption degree	W x H = 137 mm x 137 mm
Inst. depth without connector	40 mm
Inst. depth with connector	75 mm
Operating temperature	0 to +45 °C
Storage temperature	-20 to +50 °C

7 Design und Function

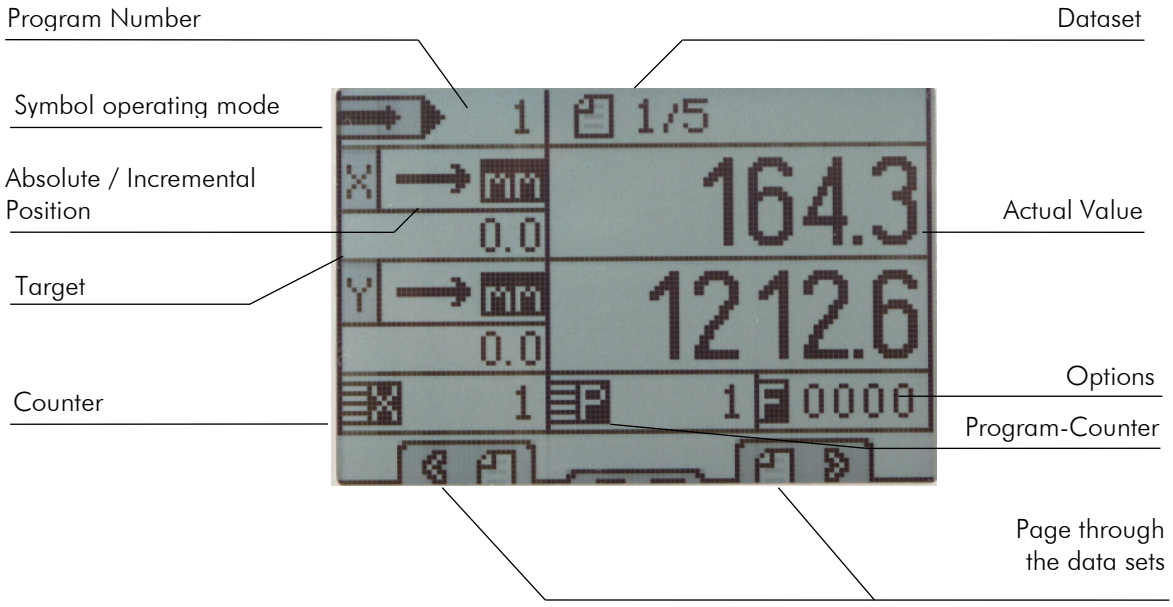
7.1 Function of keys

	Change Operation mode between „Manual“ and „Single“
	Operation Mode “Program” (only at activated program mode)
ESC	Activating (pressing 3 sec.) or exiting of the Operation Mode or a Sub menu(pressing shortly).
	Select or Confirm
	Cursor navigation „up“
	Cursor navigation „down“
F1 ... F3	Function keys (addicted to Menu or Operation mode)
	Clear or reset an input
+/-	Change of sign
0 ... 9	Enter Target Value or Parameter value

Start positioning

Stop positioning

7.1.1 Function of Display



NOTE!
Display elements can vary depending on control mode and configuration.

8 Operation and Operation Modes

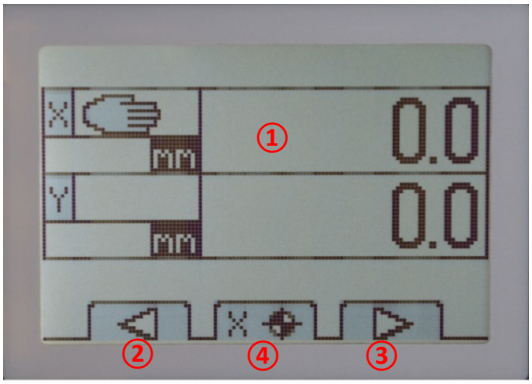
8.1 Operation Modes

Depending on the configuration and operation mode the different values can be changed and the function buttons can be used differently.

8.1.1 Manual Mode

In this mode you can move the axes manually.

To do this, select the corresponding axis with the cursor and change the position via the functional keys (F1 / F3).



① Display of actual value of corresponding axis.

② Key-F1: Move axis in negative direction.

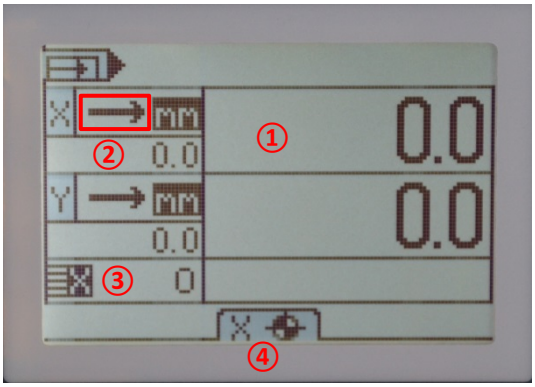
③ Key –F3: Move axis in negative direction.

④ Taste-F2: Referencing of corresponding axis.
Select corresponding target value of the axis with the cursor and press Key-F2 more than 2 seconds.

	Note! With the Menu Axis -> times -> "manual change" a time can be forced. If you move manually, there is a change from creep speed to fast speed, after the expiration of the adjusted time. ☞ see Chapter "Axis Menu – Times" and Chapter „Parameter Table" → Axis Parameter / Times → „manual change " Referencing: ☞ see Chapter „ Referencing " , "Menu Axis-Settings" and "Parameter Table"

8.1.2 Single Mode

After setting of nominal values and confirmation of with the Start-Key, all active axes will be moved simultaneously in this mode.



① Display of actual value of corresponding axis.

Incremental positionig:

- ▭ target value is absolute position
- ▪ target value is incremental position +
- ▪ target value is incremental position -

② Display if target value of corresponding axis.

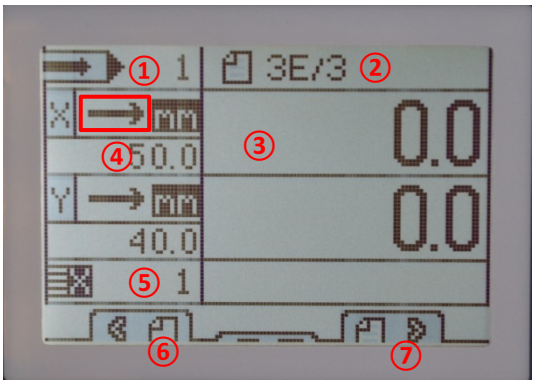
③ Setting field for quantities.

④ Key-F2: Referencing of corresponding axis.
Select corresponding axis with the cursor and press Key-F2 more than 3 seconds.

	NOTE! Incremental Positioning: Select corresponding axis with the cursor and change positioning mode by pressing the Enter-Key. ☞ see Chapter "Axis Menu – Settings" Referencing: ☞ see Chapter „ Referencing ", "Menu Axis-Settings" and "Parameter Table"

8.1.3 Program Mode

Using the program mode the user has the possibility to summarise several sets to a program. Depending on the configuration different program flows are possible.



① Set program number and confirm with Enter-Key.

Incremental positionig:

- target value is absolute position
- target value is incremental position +
- target value is incremental position -

② Field display actual dataset and end of program (example. 3E = 3 last dataset)

③ Display of actual value of corresponding axis.

④ Display if target value of corresponding axis.

⑤ Setting field for quantities.

⑥ Key F1: Previous dataset.

⑦ Key F2: Next dataset

Setting a Program

The program mode is selected through the program key.

To be able to generate a program, you first have to assign a program number and confirm with the enter key. On this Program you then load the corresponding data sets. The keys "F1" and "F3" serve to navigate through the various program data sets. It is also possible to select a data set directly, by entering the set number in the corresponding input field and pressing the enter key. After entering the required data sets the program end has to be marked. For this you need to press the "F2" key in the input field. From this moment on, the program end is marked with the letter "E" behind the last set number.

Processing a Program

The program mode can be selected directly by using the program key. First, choose a program by entering a program number and confirm it with the enter key. With the keys F1 and F3 you can scroll again through all the sets. The automatic positioning starts by pressing the start key. Now, all data sets will be processed in dependency of the set parameters until the end marker of the program is reached. The positioning process can be intercepted by pressing the stop key at any time and the program then remains in the current set. To continue the program, press the start button again.

NOTE!
The end of program is necessarily needed for the automatic run.
In case of missing end of program a warning is displayed.

Incremental Positioning:
Select corresponding axis with the cursor and change positioning mode by pressing the Enter-Key.

☞ see Chapter "Axis Menu – Settings"

8.2 Referencing

In the manual mode and single mode the axes can be referenced. Depending on the setting in „Axes-Parameters -> Settings -> Mode reference" the following applies:

- Mode 1, 3, 5, 7: The "F2" key has to be pressed for at least 2 sec. With a two-axes controller, the reference symbol of the corresponding axis has to be displayed (in the manual mode the corresponding axis needs to be selected, in the single mode the target value of the corresponding axis needs to be selected).
- Mode 2, 4, 6, 8: an external Input has to be activated in order to reference
- Mode 1 o. 2: the value stored in the Menu Axis-> Axis -> Distances -> reference is taken as the current actual value for the axis
- Mode 3 o. 4: the value entered for target position is taken as the current actual value.
- Mode 5 o. 6: Reference drive to switch end-position positive with index pulse. (see next Chapter)
- Mode 7 o. 8: Reference drive to switch end-position negative with index pulse. (see next Chapter)

8.2.1 Function of Reference Drive

The controller moves to the axis that needs to be referenced in dependence of the parameter: Menu Axis→ Axis → General Axis Parameter → Mode reference. The output "reference drive run" is set. If the corresponding input (switch end-position positive or negative) is activated, the controller stops. After a dwell time it moves in the opposite direction. Once the appropriate input (switch end-position) is disabled, the index pulse will be released. For the next zero pulse the controller stops and the reference value stored in the parameter: Menu Axis→Axis →Distances→Reference will be transferred in the actual value window.

9 Installation and First Start-Up

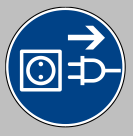
CAUTION
Please read the operating manual carefully before using the device!
Strictly observe the Installation instructions!
In case of damage caused by failure to observe this operating manual, the warranty expires.

ELGO is not liable for any secondary damage and for damage to persons, property or assets.

The operator is obliged to take appropriate safety measures. The first start-up may only be performed by staff that has been trained and authorized by the operator.

9.1 Operating Area

WARNING!
Do not use the device in explosive or corrosive environments!
The device must not be installed close to sources of strong inductive or capacitive interference or strong electrostatic fields!



CAUTION!
The electrical connections must be made by suitably qualified personnel in accordance with local regulations.

The device may be designed for switchboard mounting. During work on the switchboard, all components must be de-energized if there is a danger of touching the energized parts!
(protection against contacts)

Wiring works may only be performed in the de-energized state!

Thin cable strands have to be equipped with end sleeves!

Before switching on the device, connections and plug connectors have to be checked!

The device must be mounted in a way that it is protected against harmful environmental influences such as splashing water, solvents, vibration, shock and severe pollution and the operating temperature must not be exceeded.

9.2 Mounting / Installing

For the installation of the device an opening according the disruption degree (see Chapter "Technical Data"), must be cut in machine chassis.

The device is tensed up by two studs and two swiveling flaps, screwed on in the case, with the machine chassis (included in delivery). Only a screwdriver is necessary for this.

9.1 Activation of the device

The device starts automatically after operation voltage application.

10 Menu Structure, Sections and Parameters

- Operating Modes
  - Manual Mode
  - Single Mode
  - Program Mode
- Service (press 3 sec the "ESC-Key")
  - Parameter axis
    - X-axis
      - Distances
      - Times
      - Analogue (only with Option PID)
      - General Parameter
    - Y-axis (only with 2 axes- version)
      - Distances
      - Times
      - Analogue (only with Option PID)
      - General Parameter
  - System
    - Settings
    - System-times
    - I/O-configuration
      - Input function
      - Input logic
      - Output function
      - Output logic
    - Default parameter
  - Password
  - Diagnosis
    - Input
    - Output
    - Keyboard
    - Version

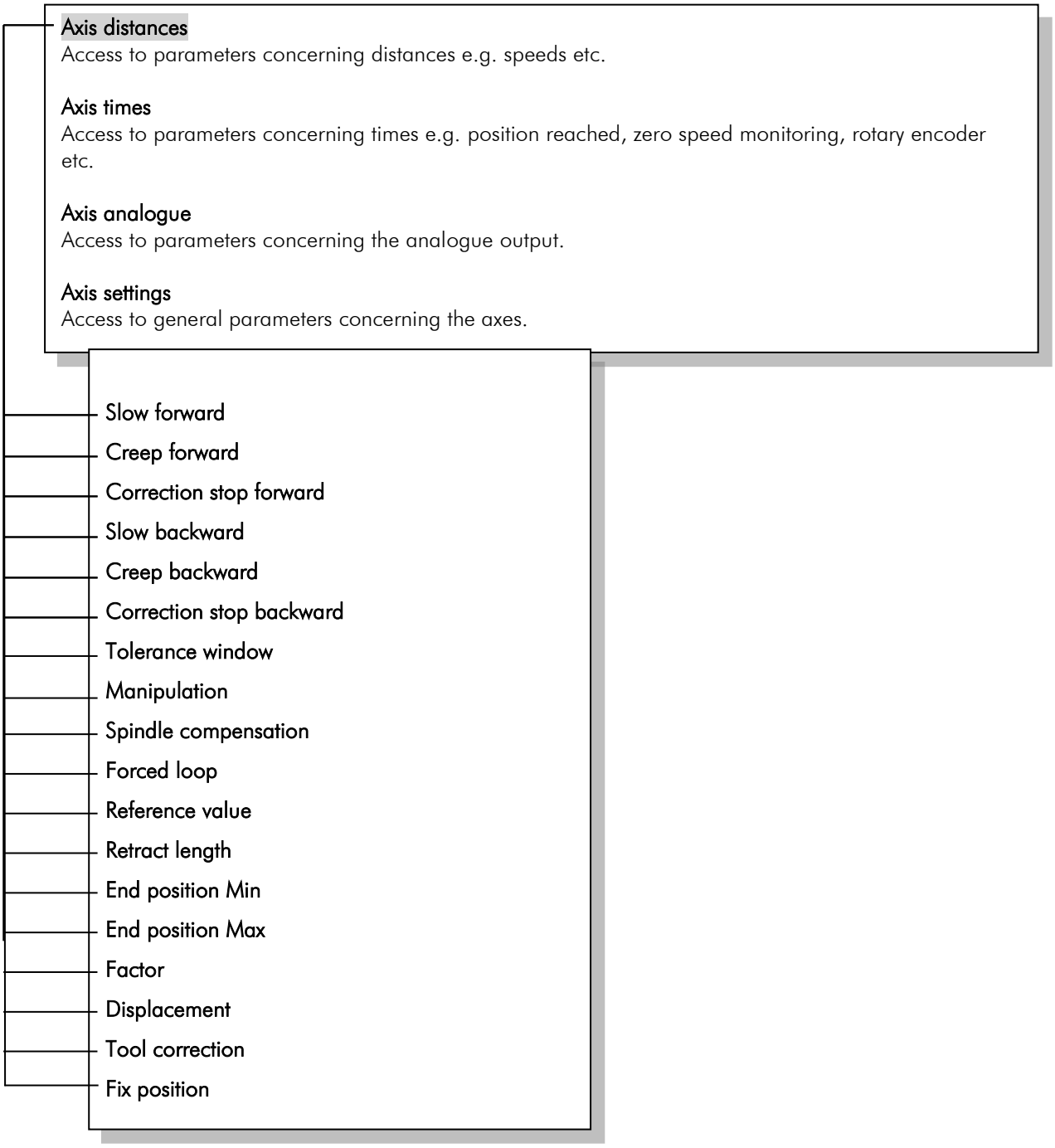
NOTE!
The service operation/parameter level can be reached by holding the "ESC" button for about 3 seconds.
Most of the parameters, if not otherwise designated can only be changed after entering the password/ PIN code.

PIN CODE: 250565

11 Menu Axis

11.1 Menu Axis - Distances

Relevant distances for the axes can be set in this menu.



Slow forward/slow backward = middle speed

This parameter serves the input of the distance, at which the controller switches from high speed to slow speed before reaching the target position.

Creep forward/creep backward = slow speed

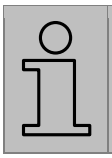
This parameter serves the input of the distance, at which the controller switches from slow speed to creep speed before reaching the target position.

Correction stop forward/correction stop backward

Here a constant overrun can be compensated.

Example:
The target position is overrun by 0.2 mm constantly. The data entry has to be 0.2mm.
The stop command is then moved forward by 0.2 mm.

When starting the operation the stop offset is set first to "0" in order to be able to calibrate the overrun accurately. For an exact positioning the stop offset should be as small as possible (0.0 to 0.2 mm) i.e. the mechanical friction should be steady over the entire run distance and the slow speed and/or creep speed must be adjusted accordingly small.



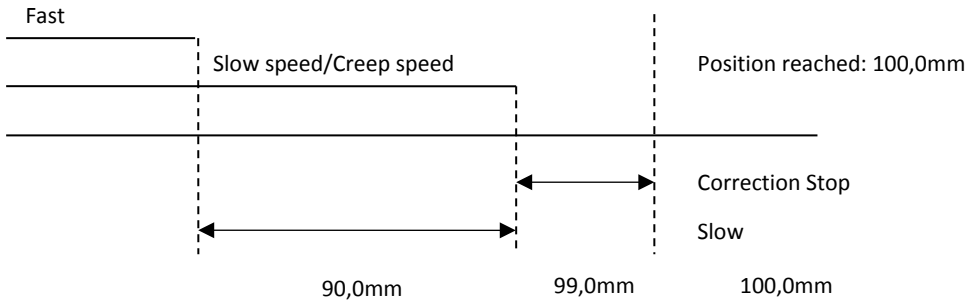
NOTE!
When positioning with PID, the correction stop serves as tolerance window.

Example: Positioning with two speeds

For the adjustment of the parameters generally applies:

Slow speed = Creep speed > Correction stop

Slow speed: 10,0mm
Creep speed: 10,0mm
Correction stop: 1,0mm

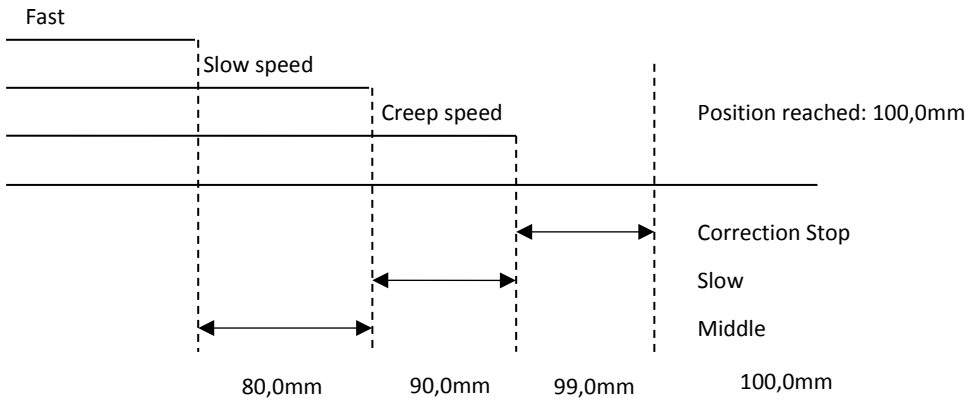


Example: Positioning with three speeds

Here for the adjustment of the parameters generally applies:

Slow speed > Creep speed > Correction stop

Slow speed: 20,0mm
Creep speed: 10,0mm
Correction stop: 1,0mm



Tolerance window

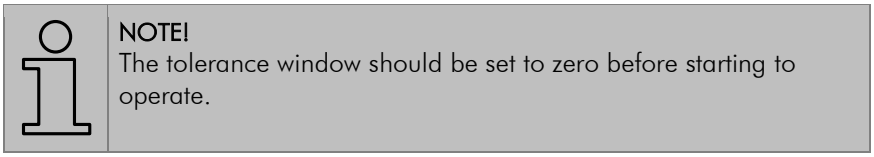
If the current actual position of the target position corresponds + / - to the value of "tolerance window", the corresponding output "tolerance zone" (see the main configuration) is set.

Manipulation

It is possible to adjust the indicator of the actual value of the corresponding axis to the target value within the entered tolerance window. The entered range of tolerance is always active in the + and – range around the demand value. The real actual value is saved in the processor, i.e. no positioning errors add up.

Example:
Entered Value = 0,2mm (i.e. Tolerance Window +/- 0.2mm)

Internal actual value	99.8 mm
Displayed actual value	100.0 mm
Target Value	100.0 mm



NOTE!
The tolerance window should be set to zero before starting to operate.

Spindle compensation

In order to adjust spindle or sprocket tolerances the target position must always be approached from the same direction, i.e. in one direction the target position will be overrun by the entered value. After expiration of the time that was entered in menu/times/backlash dwell the entered target position will be reached again.

Forced loop

If the actual value is within the range target value +/- value of forced loop window during an absolute positioning a forced loop is moved.

Reference value

A reference value and a reference position can be forced in this parameter.

Retract length

When activating the external retract input, the axis moves depending on the retract mode (see Chapter „ Menu Axis - Settings -> Retract Mode") around this value or on this value.

Software-end position minimum/maximum

These two values can be used if no mechanical switch end-positions are present or additionally for already existing mechanical switch end-positions.

End position min.: This value should be between the smallest length/position that has to be proceeded and zero (respectively shortly before the mechanical switch end-position).

End position max.: This value should be between the largest length/position that has to be proceeded and the maximum length (respectively shortly before the mechanical switch end-position).

Factor

The factor for analysis of the pulses is set here.

$$\text{Factor} = \frac{\text{Distance (Angle)}}{\text{Amount of clock pulse edges A and B}}$$

NOTE!
As of the Software Version 1.64 the decimal point (number of positions after decimal point) is calculated automatically.
The controller has 4-edge-triggering!

Displacement (no PIN necessary)

Here positive or negative dimensions are programmed, which are added to the actual value by activating an allocated input.

Tool correction (Saw blade) (no PIN necessary)

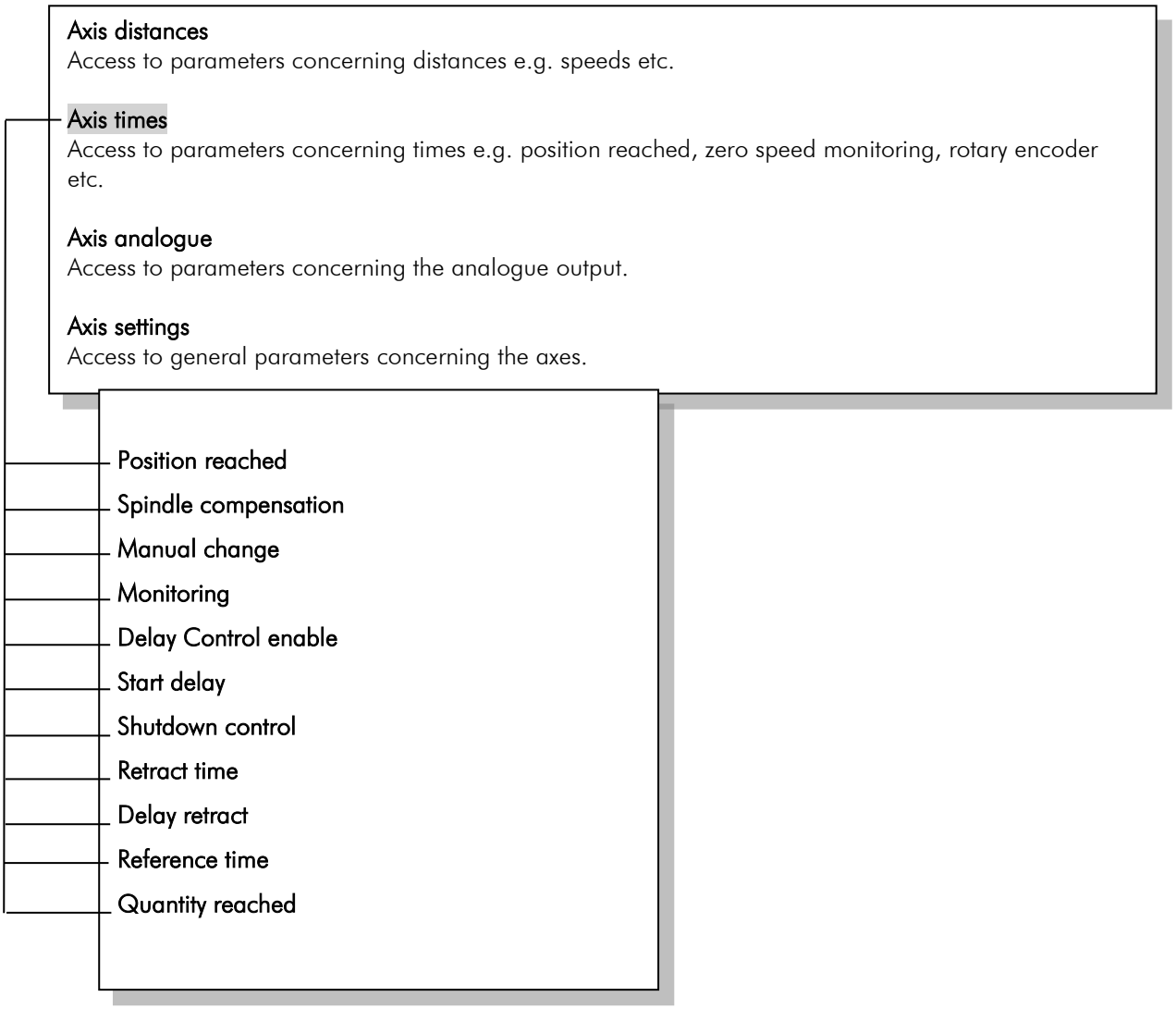
In the incremental measurement mode this correction value is automatically added, i.e. the positioning process continues working off to this value

Fix Position

Length values to control the length limit stop axes can be set here. If the set values are reached / passed the corresponding output is .

11.2 Menu Axis - Times

The times relevant for the respective axis can be entered here.



Position reached

The output signal is based on a variable time during input of a time value or statically/maintained (axis in position) if the value is set to 0.
It is set if the according axis has reached the target position.

Spindle compensation

In the peak of the loop drive, the drive signals decline. The controller returns to the target value when the parameterized time has expired (adjustment range 0.0 sec. … 99.9 sec.). If the value is zero, there is no waiting period at the peak.

Manual change

Here the time in manual mode can be entered to set the speed from the low speed to the next higher speed.

Monitoring

Here a time (adjustment range 0.0 sec. ... 99.9 sec.) is set to monitor the measurement system. If there are no signals from the measuring system during the programmed period of time, the drive signals are switched off to stop the engine. If the value is zero the monitoring is deactivated.

Delay control enable

After the start command the output "control enable" is activated. After reaching the target position and only after the expiration of the programmed time (adjustment range 0.0 sec. … 99.9 sec.) in the parameter "fall delay time control enable" the output is set back. If the parameter "delay control enable" is at the value of zero, the output for the control enable is adjusted statically and remains set until a change of operation modes respectively until activating the stop key.

Start delay

At a starting command the start of the positioning is delayed for the entered time.

Shutdown control

Here the time for shutdown after the position is reached is entered (adjustment range 0.0 sec. ... 99.9 sec.).

Retract time

The dwell-time at the peak is entered here (adjustment range 0.0 sec. …99.9 sec.). After this time the position control is set back from the retract peak to the target value. In addition this value is also used for a retraction on time.

Delay retract

The retract is delayed for the entered time.

Reference time

In the peak of the reference run, the drive signals decline. The controller will continue positioning when this time has expired (adjustment range 0.1 sec. ... 99.9 sec.).

Quantity reached

Here the time is entered in 0.1 sec. for the signal "quantity reached". If the value = 0, the output "quantity reached" is statically set.

11.3 Menu Axis - Analog

The axis relevant analogue parameters can be set in this menu.

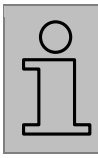
Axis distances
Access to parameters concerning distances e.g. speeds etc.

Axis times
Access to parameters concerning times e.g. position reached, zero speed monitoring, rotary encoder etc.

Axis analog
Access to parameters concerning the analogue output.

Axis settings
Access to general parameters concerning the axes.

- Velocity
- Acceleration
- P-Portion
- I-Portion
- D-Position
- I-Limit
- Impulses encoder
- Start mode
- Stop mode
- Stop mode manual
- Manual fast
- Manual slow
- v Reference mode 1
- v Reference mode 2
- U fast forward
- U slow forward
- U creep forward
- U fast backward
- U slow backward
- U creep backward



NOTE!
The parameters for analogue mode are only of interest for devices with option PID.

Velocity

The maximum speed is set in this parameter, in rpm. Should there be gearing between the motor and the measuring system, this has to be considered in the calculations (e.g. gear or spindle)

Example!
Demanded (below the maximum possible !) motor speed rpm = 3000
Gearing ratio i = 10
V = rpm/i = 3000 rpm/10 = 300 rpm

Acceleration

The acceleration during positioning is set in this parameter in revolutions per square second ($\frac{[U]}{[s^2]}$).

Also here you have to consider possible gearing ratio.

P-Portion

Proportional amplification: setting range 1 ... 99999

General:
The P-controller exclusively consists of a proportional portion and has thereby its reinforcing characteristic. The P-term multiplies the input value with a constant coefficient.

P40:
At offset the difference between the target and actual value is multiplied with the entered value and shown as power-sharing. The bigger the proportional amplification the more sensitive the control loop will be (possibly even unstable).

I-portion / I-Limit

Integral step: setting range 1 ... 99999

General:
An I-controller (integrating controller) determines the control value through timed integration of the offset taking the reset time into account. A continuing offset leads to further increase of the analogue output. The reset time determines how big the temporal influence is. The maximum reset time is limited through I-limit. The step response of the I-portion is a linear increase. That means for a constant offset the integral will be increased and thus reinforces the I-portion.

P40:
At offset the analogue control voltage will continue to increase step by step until there is zero difference between the target and actual position and the entered I-limit in this parameter is reached respectively. The greater the I-portion, the slower is the response.

D-portion

Differential voltage: setting 1...1000

General:
The D-controller (differential controller) determines the control value from the derivative with respect to time of the offset.

P40:
At offset a short voltage pulse proportional to the rate of change will be put out to compensate quickly without sacrificing the stability of the control loop permanently. The value of the voltage pulse is entered. (max + / - 10 V).

Impulses encoder (rotary encoder resolution)

The number of pulses per revolution of the engine is entered in this parameter. This enables amongst others the calculation of speed to be effected (max. 9999 pulses per revolution).

Start mode

Wert	Modus
0	Is the axis in the space of the tolerance zone the axis will not be restarted.
1	Start of axis in the tolerance zone will be forced.

Stop mode / Stop mode manual

Value	Mode
0	the voltage of the analogue output is set to 0V
1	the drive is set to shut down through the highest possible acceleration
2	the drive is set to shut down through an acceleration according to the adjusted parameter

Manual fast

Here the speed "fast" for moving the axis in manual mode can be defined.

Manual slow

Here the speed „slow" for moving the axis in manual mode can be defined.

v Reference mode 1

Here the reference run speed of the stopping point until reaching the initiator is defined.

v Reference mode 2

Here the reference run speed of stopping point until reaching the index pulse is defined.

U fast / slow / creep speed forward

Voltage during fast / slow / creep speed forward.

U fast / slow / creep speed backward

Voltage during fast / slow / creep speed backward.

11.4 Menu Axis - Settings

System relevant general parameters can be entered in this parameter.

Axis distances
Access to parameters concerning distances e.g. speeds etc.

Axis times
Access to parameters concerning times e.g. position reached, zero speed monitoring, rotary encoder etc.

Axis analogue
Access to parameters concerning the analogue output.

Axis settings
Access to general parameters concerning the axes.

- Axis type
- Button manual mode
- Drive signal configuration
- Reference mode
- Spindle compensation mode
- Software end-position
- Hardware end-position
- Retract mode
- Error compensation
- Piece counter
- Incremental positioning
- Decimal point
- Display option manual
- Unit

Axis type

The type of axis is defined.

- Digital + CPU (use with positioning through digital drive signals)
- Digital + PID (use with PID version)

Button manual mode

The function of the keys in manual mode is defined in this parameter.

- off (The buttons F1, F3 on the control are deactivated for the according axis. This axis can only be moved via the correspondingly assigned inputs.)
- normal
- inverted

Drive signal configuration

With configuration of the drive signals different starting combinations for the corresponding speeds can be adjusted.

- Drive signals → Mode 1

3 speeds
Speed = output signals 1-3 ascending
Output 4 sets direction reverse

Output signals	1	2	3	4
Creep forward	X			
Slow forward	X	X		
Fast forward	X	X	X	
Creep backward	X			X
Slow backward	X	X		X
Fast backward	X	X	X	X

- Drive signals → Mode 2

2 speeds ((ELGO Standard)
Independent outputs for forwards and reverse
Independent outputs for fast and slow

Output signals	1	2	3	4
Creep forward	X	X		
Slow forward				
Fast forward	X		X	
Creep backward		X		X
Slow backward				
Fast backward			X	X

Signal configuration:

Forwards:	Drive signal 1
Creep speed:	Drive signal 2
Fast speed:	Drive signal 3
Backwards:	Drive signal 4

- Drive signals → Mode 3

2 speeds
speed = output signals 2 + 3
output 4 set direction reverse

Output signals	1	2	3	4
Creep forward	X	X		
Slow forward				
Fast forward	X		X	
Creep backward	X	X		X
Slow backward				
Fast backward	X		X	X

- Drive signals = Mode 4

2 speeds
Independent outputs for direction and speed

Output signals	1	2	3	4
Creep forward	X			
Slow forward				
Fast forward		X		
Creep backward			X	
Slow backward				
Fast backward				X

Signal configuration:

Forwards: Drive signal 1
Forwards fast: Drive signal 2
Backwards: Drive signal 3
Backwards fast: Drive signal 4

- Drive signals = Mode 5

3 speeds
Speed forward = output signals 1-3 ascending
Speed backward = always fast
output 4 sets direction reverse

Output signals	1	2	3	4
Creep forward	X			
Slow forward	X	X		
Fast forward	X	X	X	
Creep backward	X	X	X	X
Slow backward	X	X	X	X
Fast backward	X	X	X	X

- Drive signals = Mode 6

3 speeds
Binary coded
output 1 = forward
output 4 = backward
outputs 2+3 = speed

Output signals	1	2	3	4
Creep forward	X	X		
Slow forward	X		X	
Fast forward	X	X	X	
Creep backward		X		X
Slow backward			X	X
Fast backward		X	X	X

- Drive signals = Mode 7

3 speed
Forward/backward separately

Output signals	1	2	3	4
Creep forward	X			
Slow forward	X	X		
Fast forward	X	X	X	
Creep backward				X
Slow backward		X		X
Fast backward		X	X	X

Reference mode

(see Chapter "Operation and Operation Modes")

- Mode 1 Reference via parameter with "F2"- button *
- Mode 2 Reference via parameter & external input *
- Mode 3 Reference via Target value & "F2" button
- Mode 4 Reference via Target value & external input **
- Mode 5 Reference drive pos. via parameter with "F2" button **
- Mode 6 Reference drive pos. via external input. **
- Mode 7 Reference drive neg. via "F2" button **
- Mode 8 Reference drive neg. via external input **

* see axis parameters → axis → distances → reference value
** see axis parameters → axis → time → reversion Ref. drive
Extra on PID – positioning:
Menu Axis → Axis → Analogue → v. Ref. drive part 1
→v. Ref. drive part 2

- Above the "F2"-button the reference symbol of the corresponding axis is displayed
- External input has to be allocated.

Spindle compensation mode

- No spindle compensation
- Negative spindle compensation -
- Positive spindle compensation +
- With forced loop -
- With forced loop +

Software end-position

- all end positions active
- end position min deactivated
- end position max deactivated
- all end positions deactivated

Hardware end-position

- all end positions active
- end position min (defined input) deactivated
- end position max (defined input) deactivated
- all end positions deactivated

Retract mode

- Mode 1 Descent/retract to actual value + adjusted value*
- Mode 2 Descent/retract to adjusted value*
- Mode 3 Descent/retract positive to actual value for the adjusted time period**
- Mode 4 Descent/retract to actual value + adjusted value* without return
- Mode 5 Descent/retract to adjusted value* without return
- Mode 6 Descent/retract positive to actual value for the adjusted time period** without return
- Mode 7 Descent/retract to actual value – adjusted value*
- Mode 8 Descent/retract negative to actual value for the adjusted time period**
- Mode 9 Descent/retract to actual value – adjusted value* without return
- Mode10 Descent/retract negative to actual value for the adjusted time period** without return

* see Menu Axis → Axis → Distances → descent/retract distance
** see Menu Axis → Axis → Times → descent

Error compensation

Here the activity of the error compensation is defined for incremental measurement positioning.

- off
- on

Piece Counter

With this parameter the counter mode will be set into the "single mode".

- without counter
- auto decrement *
- auto decrement + Stop *
- auto increment *
- auto decrement/ increment *
- decrement **
- decrement + Stop **
- increment **
- decrement/ increment **

- With the function "**Counter increment"**, it is counting up from the current actual value.
- With the function **"Counter decrement"**, it is counting towards zero.
- With the function "counter decrement/increment", it is decrementing if a certain number of items have been assigned. If it reaches zero, the number of units corresponding to the time stored in the parameter "times-axes-quantity reached" is set for a time and not static. Then the counter is incrementing.

* reaching the position the counter will be activated
** with the input quantity the counter will be activated.

Incremental positioning

Here the option "absolute / incremental Positioning" is activated.

- off — no selection possible, always absolute positioning
- on — selection via keypad possible
- extern — selection via external inputs possible

If this function is activated, one of the following Symbols (see Fehler! Verweisquelle konnte nicht gefunden werden. **Display Elements**) is displayed.

- target value is absolute position
- target value is incremental position +
- target value is incremental position -

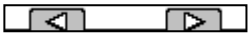
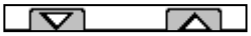
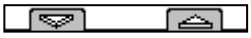
There is always an absolute measurement, if there is none of the signs on the display and if the function is deactivated.

Decimal point

- Here the decimal point is defined.

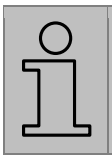
Display option manual

Here the image of the manual button will be defined.

- left – right 
- down – up 
- forwards – backwards 

Unit

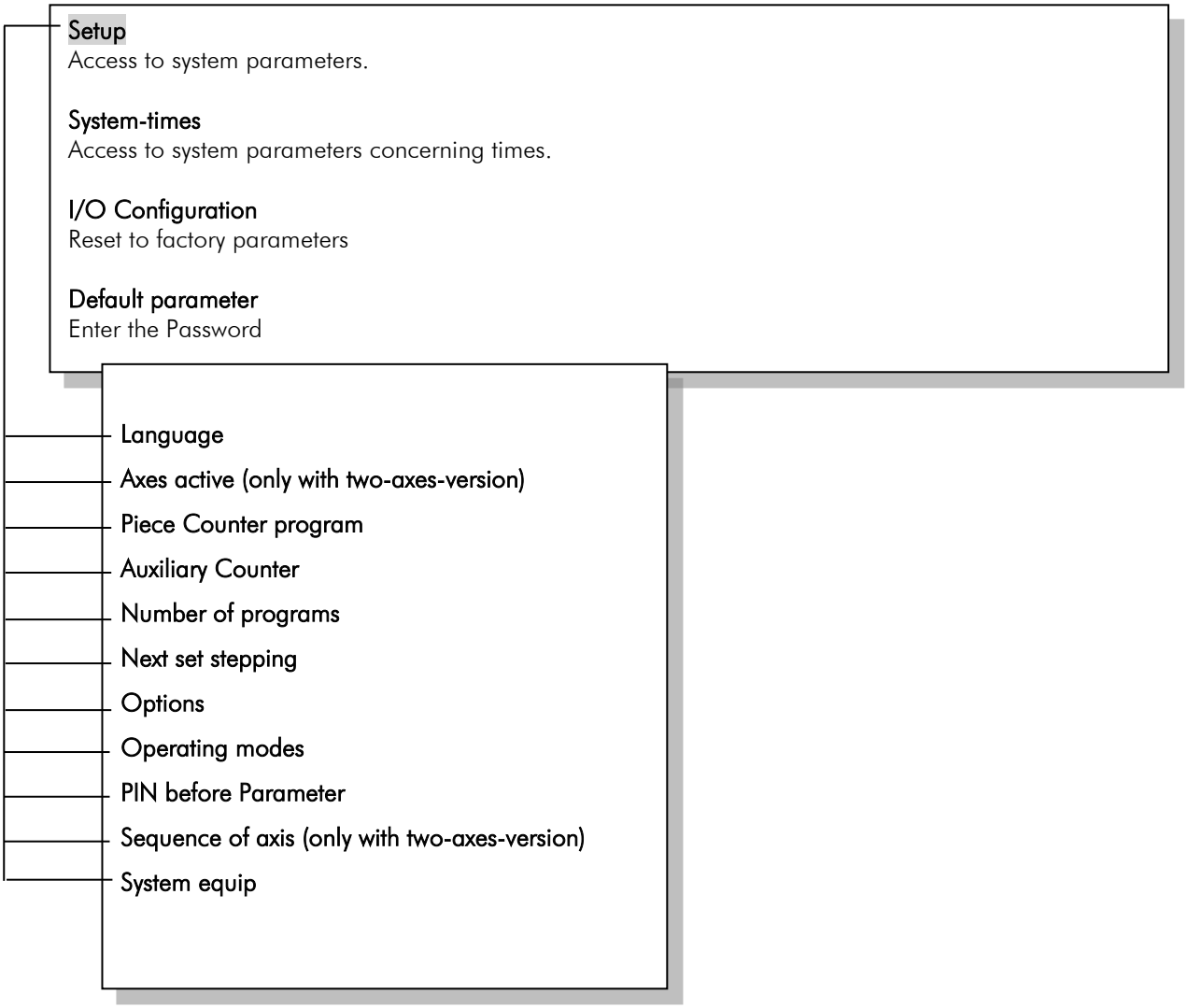
The displayed unit can be specified here: mm, inch or degree.



NOTE!
The units of the parameters remain unchanged!

12 Menu System

12.1 Menu System – Setup



NOTE!
Setting the default parameters!
In two axes version the P40 default parameters for I/O configuration are set with dependency to the occupancy of the active axes.
X-Axis active: I/O configuration of the single-axis-version
X & Y- axes active: I/O configuration of the two-axes-version

Language

- German
- English
- French
- Spanish
- Italian
- Polish
- Chinese

Axes active (only with two-axes-version)

- X-Axis
- X-Axis and Y-Axis

Piece counter program

With this parameter the piece counting mode is terminated in the option "program".

- without — no piece counter activated
- decrementing — when position reached, piece counting is activated
- incrementing — piece counting is activated via external input

If the piece counter reaches zero, the output is adjusted for a time corresponding to the time stored in parameter "system-> times-> piece counter program". In addition a next program step can be activated (this depends on further parameters).

Auxiliary counter

This parameter determines if an additional counter is available.

- without auxiliary counter
- Program
- Auto-Program

If the program counter is activated, it can be defined in the option „program", how many times the program should run through. If the program counter reaches zero, a new value entry is forced (even at default of zero).
With the function **Auto program** the next position will be automatically hit after a piece counting pulse ("piece counter program" has to be configured decrementing).

Number of programs

- 1 = 1000 sets
- 2 = 500 sets
- 5 = 200 sets
- 10 = 100 sets
- 20 = 50 sets
- 25 = 40 sets
- 40 = 25 sets
- 50 = 20 sets

Next set stepping

For the program mode, you can select the following for the next set stepping:

- without — no next step setting activated
- quantity reached — after expiration of the piece counter of the current set, the next set will be loaded
- quantity, set 1 — same as "quantity reached", additionally set 1 will be loaded after program end

Options

- off
- on — Auxiliary functions are activated. Input field appears in the display and outputs can be assigned.

See also system -> I/O-configuration -> output functions and system -> system-times -> clamp auxiliary function

Operating modes

This parameter determines which modes are possible

- single set
- single set+ manual
- single set+ program
- single set+ manual + program

Pin before parameter

This parameter determines if the service/parameter-level can be achieved with or without PIN entry.

- off — can be looked at without Pin entry, but cannot be changed
- on — parameters can only be changed with the password "250565".

Sequence of axis (only with two-axes-version)

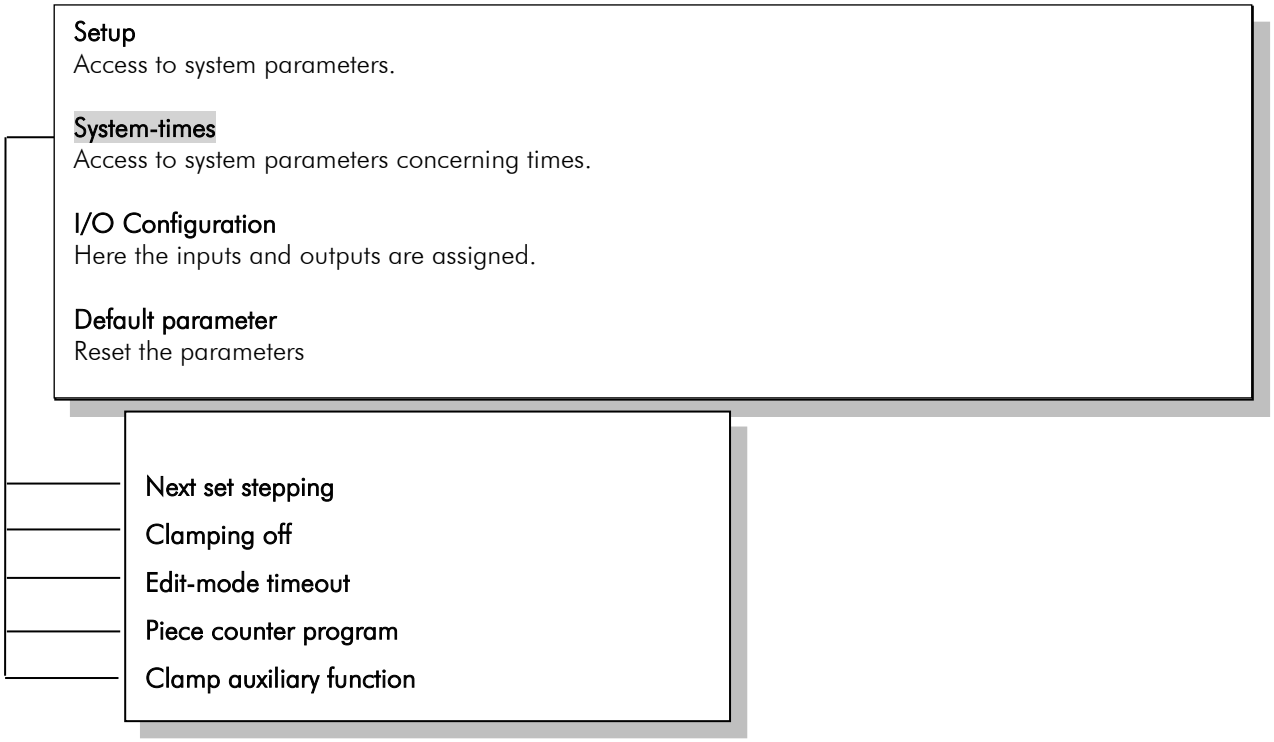
This parameter determines in which sequence the axes are going to drive:

- X-axis, Y-axis (Y-axis drives after X-axis)
- Y-axis, X-axis (X-axis drives after X-axis)
- X-axis + Y-axis (axes drive at the same time)

System equip

- off — diverse parameters are turned off
- on

12.2 Menu System – Times



Next set stepping

This is the time setting in seconds (0.0 – 9.9) how long the controller should wait in the program-mode, with auxiliary counter "auto-program" until the next set is positioned.

Clamping off

If the function „clamping off" is assigned to an output (system->I/O-configuration->output-function), the controller is waiting between setting the output and the start of positioning, as well as between resetting the output (after completion of positioning) and the release of the next action for the specified time (0.0 – 9.9).
This function is used to release (activate) e.g. a clamping system or brake right before (after) positioning.

Edit-mode timeout (no PIN necessary)

This is the time until exiting the input mode in seconds (0.0 – 9.9) (standard 3.0)

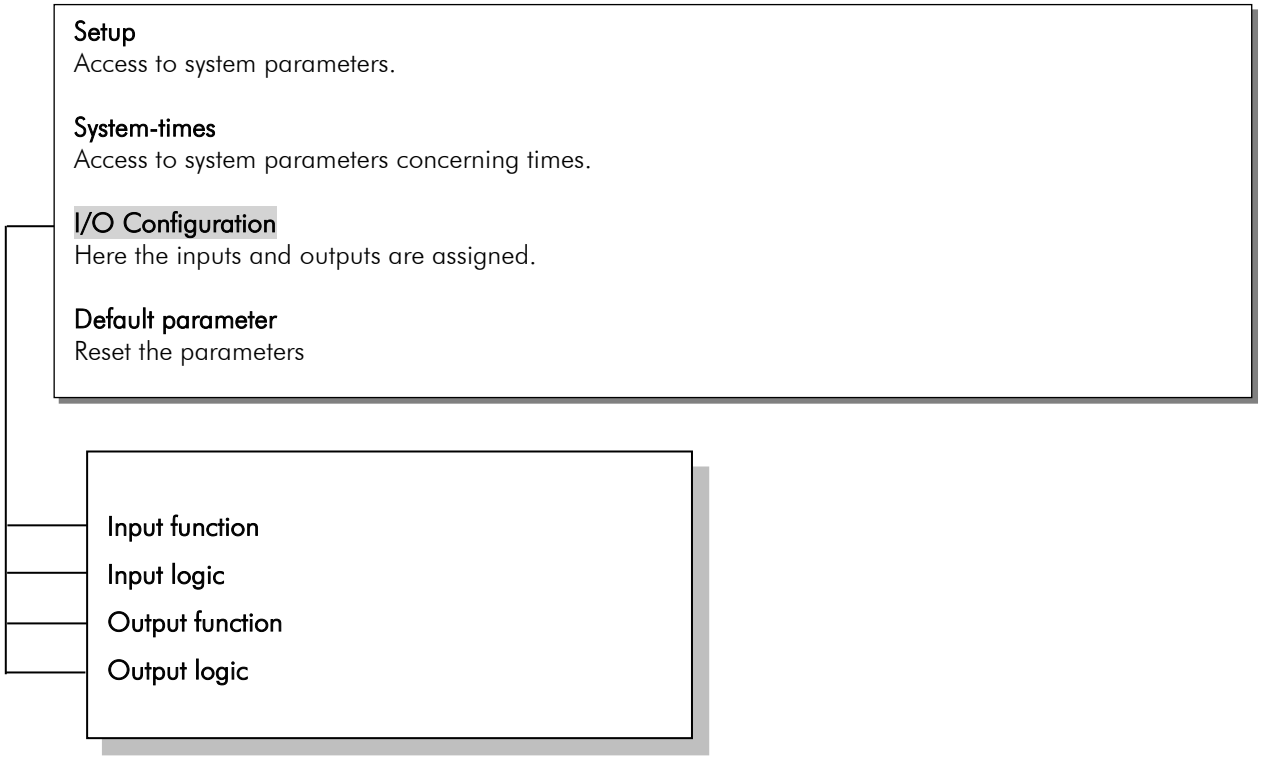
Piece counter program

Here the time is defined in seconds (0.0 – 9.9), which presents the signal "quantity reached" in the program mode. If the values = 0, the output "quantity reached is set statically.

Clamp auxiliary function

If the program mode „next program step" has been chosen and the parameter system->settings->auxiliary functions has been set to „on", the auxiliary function outputs are hold for the set time (0.0 – 9.9 in seconds). After this it is switched to the next set.

12.3 Menu System – I/O Configuration



12.3.1 Function of the Inputs

NOTE!
At the inputs „Extern Enable“, “External Stop” and „switch end-pos min/max“, the input logic is per default/factory setting set on “low active” for security reasons (failsafe).

External enable

The extern enable input is monitored during the positioning. If the input is activated, no positioning is possible respectively it will be cancelled with an error message

External start input

corresponds to the key „start“

External stop

corresponds to the key „stop“

Setting the reference

If in the system parameter Reference the mode 2, 4, 6 or 8 is set, the actual value can be calibrated through this input.

- Mode 2: Reference via external input (Reference value: Parameter-Axis-Distances)
- Mode 4: Reference via target value + ext. input (Reference value: set target value)
- Mode 6: Reference positive via external Input
- Mode 8: Reference negative via external Input

Incremental positioning negative

If this input is active, the positioning in incremental is in negative direction, if incremental positioning is externally configured (Menu Axis-> settings).

Incremental positioning positive

If this input is active, the positioning in incremental is in positive direction, if incremental positioning is externally configured (Menu Axis-> settings).

Retract function

The retract function will be started if the input is activated

Piece counter

With every pulse at this input the current quantity is increased or decreased by one piece.
Setting: Parameter-Axes- settings

- decrement
- decrement + stop
- increment
- increment/decrement

Switch endposition min/max

- switch end-pos. min
- switch end-pos. max

The switch end-position inputs are monitored during the positioning. If a switch end-position input is activated, no positioning in the corresponding direction is possible respectively the positioning will be cancelled.

Key manual mode *<Axis +/->*

If an input is assigned here, the corresponding axis can be positioned in the corresponding direction via an external key in the manual mode (joystick-function).

Tool offset

As long as this input is activated, the parameter Menu Axis -> Axis-> Distance ->Tool offset will be added to the actual value.

Fix position

If the input is activated the axis moves to the fix position. (Menu Axis-> Distances->fix position)

Enable axis

The input is monitored during the positioning. If the input is activate the positioning is not possible. The positioning is canceled and an error message is set.

12.3.2 Function of Outputs

Position reached (variable / static)

If "0.0s" is entered in Menu Axis -> Times -> Position reached, the output is static i.e. the output is active, after the target value has been reached.
If a value between 0.1 – 99.9s is entered, the output is set on variable i.e. the output is reset after the entered time has expired.

Drive Signal

The drive signal outputs are configurable via Menu Axis -> General Parameter -> Drive Signal Configuration.

Control enable

Before a positioning the signal control enable is set.
After reaching the target position and only after expiration of the time Menu Axis -> Times -> delay control enable the signal control enable is reset.

Quantity reached (variable / static)

If "0.0s" is entered in Menu Axis -> Times -> Quantity reached, the output is set statically when the quantity is reached. At „start" the output is reset.
If a value between 0.1 – 99.9s is entered, the output is set variably i.e. the output is reset after expiration of the entered time.

Tolerance window <*Axis*>

If the current actual position corresponds to the target value +/- the value Menu Axis -> Axis-> Distance –> Tolerance window, this output is set.

Reference drive

This output is set during a reference drive

Tool enable

In manual mode:	the output is set when changing into the manual mode and is reset during a positioning.
In single- and program-mode:	the output is reset when changing in one of these modes and is set after each positioning. The output can be reset with the stop-key.

Program-end

The output is set, after the set with end marker has been proceeded.
If „program" respectively „auto-program" has been selected in System -> Settings ->auxiliary counter, the number of program runs has to be reached additionally.

Auxiliary function

In the single- and program-mode these outputs are set according to display input.
Menu System – Times -> Clamp auxiliary function

Clamping

This output is set before a positioning and is reset after a positioning (e.g. clamping system or activating/releasing the brake)
Menu System – Times -> Clamping

All axes on position (only two-axes version)

If both current actual values correspond to the according target positions +/- Menu Axis -> Axis -> Distance -> Tolerance window, this output is set.

Retract s1 axis

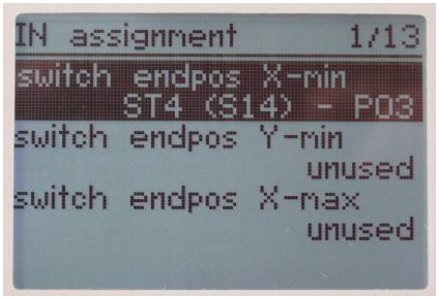
This output is active during retract.

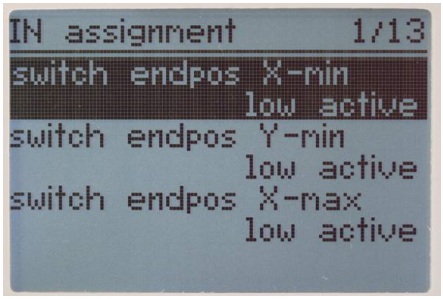
12.3.3 Configuration of Inputs and Outputs

The inputs and outputs can be configured freely with their associated logic

12.3.3.1 Linking of Inputs with Functions

In the Chapter "Table of I/O Configurations" you will find an overview of all functions which can be assigned to the inputs. After dialling a function by using the navigation buttons you can select an input for this function by pressing the Enter key. If a previously used input needs to be reset, you can use "delete key" to dial in the "not used" state. It is also possible to press the Enter key repeatedly until "not-used" is displayed. A multiple use of inputs is not possible here. If an input is already used only the next free input can be chosen automatically.



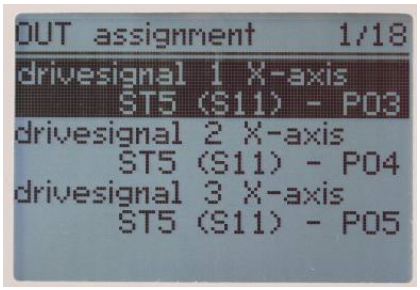


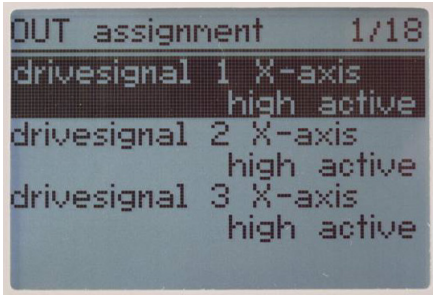
12.3.3.2 Assigning the Logic to input

If you have allocated the inputs of the controller with functions, then you can use this menu to define whether the corresponding input function shall be triggered at a logical "High"-level or at a logical "Low"-level. Assigning the logic takes place by selecting the corresponding function and pressing the enter key.

12.3.3.3 Linking of Outputs with functions

In the Chapter “Table of I/O Configurations” you will find an overview of all functions of the outputs which can be assigned. After dialling a function by using the navigation buttons you can select an output for this function by pressing the Enter key. If a previously used output needs to be reset, you can use the "delete key" to dial it in the "not used" state. A multiple use of outputs is not possible here. If an output is assigned with a function, only the next free input can be chosen automatically.



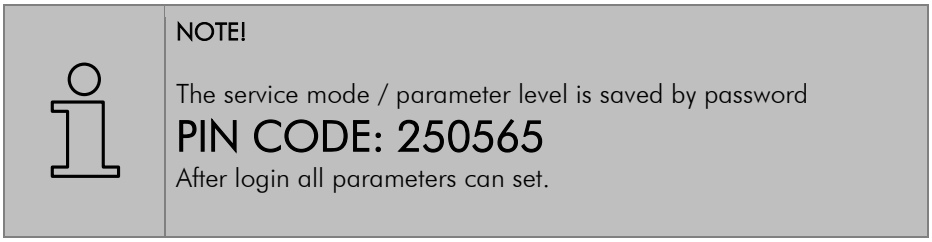


12.3.3.4 Assigning the Logic to Outputs

For the outputs it is also possible to assign logic depending on the selected output function. The setting follows the same procedure as in Chapter “Assigning the Logic to Inputs “.

13 Menu Password

The password is input in the menu password.



Press Enter or Key F2 to confirm your password input.

14 Menu Diagnosis / Error Messages

14.1 Menu Diagnosis

Here function to test the hardware and to display the current installed hard- and software versions are offered.

- Inputs
- Outputs
- Keypad
- Version/Info

14.2 Error Message

Table 3 Error Messages

Error Message	Meaning	Possible reasons / correction
Error 01	hardware end switch minimum axis X active!	Check the signals/wires of the corresponding input or deactivate the according input function (see Chapter "Linking of Inputs with functions")
Error 02	hardware end switch minimum axis Y active!	
Error 04	hardware end switch maximum axis X active!	
Error 05	hardware end switch maximum axis Y active!	
Error 16	external stop on error active!	
Error 25	no enable!"	
Error 07	software end position minimum axis X fell below!	Check the corresponding parameter or deactivate the according software end position (see Chapter "Menu Axis – Settings")
Error 08	software end position minimum axis Y fell below!	
Error 10	software end position maximum axis X fell above!	
Error 11	software end position maximum axis Y fell above!	
Error 13	no measuring system axis X!	Check the according measuring system respectively its signals/wires
Error 14	no measuring system axis Y!	
Error hler 17	power failure. Switch on control again and check the axis-position	Check the according measuring system respectively its signals/wires
Error 18	access denied	You have no authorisation to process this function or you have not entered a password (PIN), respectively the wrong one

15 Menu Contrast

In this menu the contrast of the display can be configured.
Use therefor the following buttons:

16 Parameter Table

Table 4 Axis Parameters - Distances

Function	Setting Range	Default Setting
Slow forward	0,0 – 9999,9 *	15,0
Creep forward	0,0 – 9999,9 *	15,0
Correction stop forward	0,0 – 9999,9 *	0,0
Slow backward	0,0 – 9999,9 *	15,0
Creep backward	0,0 – 9999,9 *	15,0
Correction stop backward	0,0 – 9999,9 *	0,0
Tolerance window	0,0 – 9999,9 *	0,0
Manipulation	0,0 – 9999,9 *	0,0
Spindle compensation	0,0 – 9999,9 *	5,0
Forced loop	0,0 – 9999,9 *	1,0
Reference value	-9999,9 – 9999,9 *	0,0
Retract length	0,0 – 9999,9 *	5,0
End position min.	-99999,9 – 99999,9 *	-2000,0
End position max.	-99999,9 – 99999,9 *	2000,0
Factor	0,0 – 9,999999	0,100000
Displacement	-9999,9 – 9999,9 *	0,0
Tool correction	0,0 – 9999,9 *	0,0
Fix position	-9999,9 – 9999,9 *	0,0

* = dependent on decimal point setting (particulars with 1/10)

Table 5 Axis Parameters - Times

Function	Setting Range	Default Setting
Position reached	0,0 – 99,9 [s]	1,0
Spindle compensation	0,0 – 99,9 [s]	1,0
Manual change	0,0 – 99,9 [s]	1,0
Monitoring	0,0 – 99,9 [s]	0,0
Delay Control enable	0,0 – 99,9 [s]	1,0
Start delay	0,0 – 99,9 [s]	0,0
Shutdown control	0,0 – 99,9 [s]	0,0
Retract time	0,0 – 99,9 [s]	1,0
Delay retract time	0,0 – 99,9 [s]	0,0
Reference time	0,0 – 99,9 [s]	1,0
Quantity reached	0,0 – 99,9 [s]	0,0

Table 6 Axis Parameters - Analog

Function	Setting Range	Default Setting
Velocity	0 – 9999 [U/min]	3000
Acceleration	0 – 9999 [U/s²]	50
P-Portion	0 – 99999	5
I-Portion	0 – 99999	3
D- Position	0 – 99999	1
I-Limit	0 – 99999	10
Impulses encoder	0 – 9999	360
Start mode	0,1	1
Stop mode	0,1,2	1
Stop mode manual	0,1,2	1
Manual fast	0 – 9999 [U/min]	2000
Manual slow	0 – 9999 [U/min]	1000
v Reference mode 1	0 – 9999 [U/min]	500
v Reference mode 2	0 – 9999 [U/min]	250
U fast forward	0 – 9,9 [Volt]	3,0
U slow forward	0 – 9,9 [Volt]	2,0
U creep forward	0 – 9,9 [Volt]	1,0
U fast backward	0 – 9,9 [Volt]	- 3,0
U slow backward	0 – 9,9 [Volt]	- 2,0
U creep backward	0 – 9,9 [Volt]	- 1,0

Tabelle 1Calibration of analog Inputs

Function		Setting Range	Default Setting
minimal comply	angle, distance	-99999.9 – 99999,9 [°, mm]	0
	transformer increment	0 - 4095	0
maximal comply	angle, distance	-99999.9 – 99999,9 [°, mm]	90.0
	transformer increment	0 - 4095	4095

Table 7Axis Parameters Settings

Function	Setting Range	Default Setting
Axis type	Measuring system - - - drive outputs	
	Encoder - - - Digital	X
	Encoder - - - PID + Digital	
	Analog - - - Digital	
	Encoder - - - Analog+ Digital	
	Analog - - - Analog+ Digital	
Button manual mode	normal, inverted, off	normal
Drive signal configuration	Mode1, 2, 3, 4, 5, 6, 7, 8	Mode12
Reference mode	Mode 1, 2, 3, 4, 5, 6, 7, 8	Mode11
Spindle compensation mode	without with spindle +/- forced loop +/-	without
Software end-position	both enabled negative disabled positive disabled both disabled	both enabled
Hardware end-position	both enabled negative disabled positive disabled both disabled	both enabled
Retract mode	Mode11, 2, 3, 4, 5, 6, 7, 8, 9,10	Mode11
Error compensation	off/on	off
Piece counter	without auto decrement auto decrement + Stopp auto increment auto decrement / increment decrement decrement + stop increment decrement / increment	auto decrement
Incremental positioning	off/on	on
Decimal point	without, 1/10, 1/100, 1/1000	1/10
Display option manual	Left-right down-up forward-backward	Left-right
Unit	mm / inch / degree	mm

Table 8 System - Settings

Function	Setting Range	Default Setting
Language	D / GB / F / E / I / PL / CHN	GB
Axes active (only with two-axes-version)	X-axis X- axis + Y- axis	X- axis + Y- axis
Piece Counter program	decrement without auto decrement	auto decrement
Auxiliary Counter	without Program Auto-program	without
Number of programs	1, 2, 5, 10, 20, 25, 40, 50	50
Next set stepping	without quantity reaches quantity reaches + Satz1	quantity reaches
Options	without / auxiliary function/ value retract	without
Operating modes	Single Single+ Manual Single+ Program Single+ Manual + Program	Single+ Manual+ Progr.
PIN before Parameter	off/on	off
Sequence of axis (only with two-axes-version)	x- axis , Y- axis Y- axis , x- axis x- axis + Y- axis	x- axis , Y- axis
System equip	off/on	on

Table 9 System - Times

Function	Setting Range	Default Setting
Next set stepping	0.0 … 9.9 [s]	0.0
Clamping off	0.0 … 9.9 [s]	0.0
Edit-mode timeout	0.0 … 9.9 [s]	2.0
Piece counter program	0.0 … 9.9 [s]	0.0
Clamp auxiliary function	0.0 … 9.9 [s]	0.0

17 I/O Configuration Table

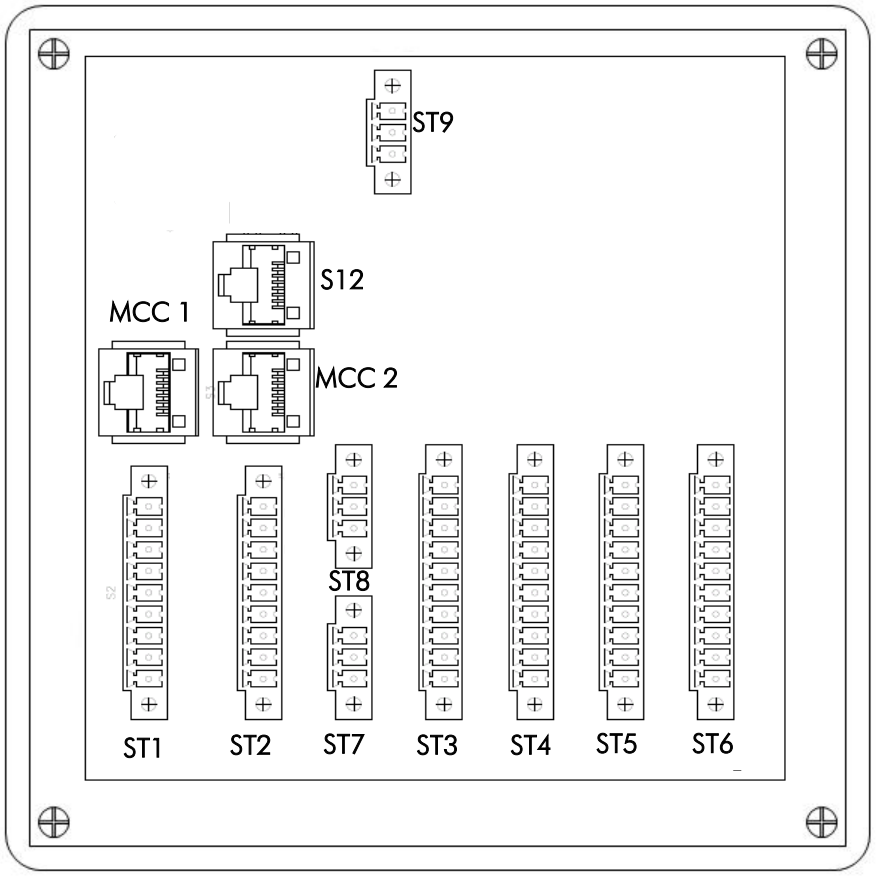
Input / Function	ST3								ST4 (with Option 16I/O configurable)								Logic	
	3	4	5	6	7	8	9	10	3	4	5	6	7	8	9	10	default	customer
Switch endpos X-min																	L	
Switch endpos X-max																	L	
Switch endpos Y-min																	L	
Switch endpos Y-max																	L	
Retract X-axis																	H	
Retract Y- axis																	H	
Reference X- axis																	H	
Reference Y- axis																	H	
Extern enable																	H	
Extern Start																	H	
Extern Stop																	L	
Piece counter X																	H	
Displacement X																	H	
Displacement Y																	H	
Button manual X+																	H	
Button manual X-																	H	
Button manual Y+																	H	
Button manual Y-																	H	
Fix position X																	H	
Fix position Y																	H	
Start X-axis																	H	
Start Y-axis																	H	
Enable X-axis																	H	
Enable Y-axis																	H	

"L" corresponds to input "Low-active", "H" corresponds to input "High-active"

Output / Function	ST5								ST6 (with Option 16I/O configurable)								Logic	
	3	4	5	6	7	8	9	10	3	4	5	6	7	8	9	10	default	customer
Drive signal 1 X-axis																	H	
Drive signal 2 X-axis																	H	
Drive signal 3 X-axis																	H	
Drive signal 4 X-axis																	H	
Drive signal 1 Y-axis																	H	
Drive signal 2 Y-axis																	H	
Drive signal 3 Y-axis																	H	
Drive signal 4 Y-axis																	H	
Control enable X-axis																	H	
Control enable Y-axis																	H	
Position reached X-axis																	H	
Position reached Y-axis																	H	
Tolerance zone X-axis																	H	
Tolerance zone Y-axis																	H	
Reference drive X-axis																	H	
Reference drive Y-axis																	H	
Quantity reached																	H	
All axis in position																	H	
Tool enable																	H	
Program-ende																	H	
Clamping																	H	
Retract s1 X-axis																	H	
Retract s1 Y-axis																	H	

"L" corresponds to input "Low-active", "H" corresponds to input "High-active"

18 Pin Assignment



ST1	Measuring system connection
ST2	Measuring system connection (only at 2-axes-version)
ST3/ST4	digital inputs
ST5/ST6	digital outputs
ST7	Analogue output (PID)
ST8	Analogue output 2 (PID) (only at 2-axes-version)
ST9	Power supply
MCC1	Control signal 1 (PID) (e.g. in combination with the Motor Drive Controller P100 MCC)
MCC2	Control signal 2 (PID) (e.g. in combination with the Motor Drive Controller P100 MCC) (only with 2 axes version)
S12	PC-Interface

NOTE!
The Analogue Output is only available for devices with Option PID.

18.1 Overview connector pin assignment

(Default assignment – factory setting)

ST1	Measuring system incremental
1	0V
2	Output 24VDC (optional 5VDC)
3	Channel A
4	Channel B
5	Earth
6	Channel /A
7	Channel /B
8	Channel Z (index pulse)
9	Channel /Z (index pulse)

ST2	Measuring system incremental
1	0V
2	Output 24VDC (optional 5VDC)
3	Channel A
4	Channel B
5	Earth
6	Channel /A Optional
7	Channel /B Optional
8	Channel Z (index pulse)
9	Channel /Z (index pulse)

ST3	Inputs		
	1-axis 8 I/O	1-axis16 I/O	2-axis 16 I/O
1	0V		
2	Output 24VDC		
3	Start		
4	Stop		
5	Reference		
6	Piece counter		
7	Retract		
8	End min		
9	End max		
10	Displacement		

ST4	Inputs	
	1-axis 16 I/O	2-axis 16 I/O
1	0V	0V
2	Output 24VDC	Output 24VDC
3	NC	NC
4	NC	NC
5	NC	Reference Y
6	NC	NC
7	NC	Retract Y
8	NC	End min Y
9	NC	End max Y
10	NC	Displacement Y

ST5	Outputs		
	1-Axis 8 I/O	1-Axis 16 I/O	2-axis 16 I/O
1	0V		
2	+ 24VDC		
3	Drive signal 1 X		
4	Drive signal 2 X		
5	Drive signal 3 X		
6	Drive signal 4 X		
7	Position reached X		
8	Quantity reached X		
9	Control enable X		
10	Tolerance window X		

ST6	Outputs	
	1-Axis 16 I/O	2-Axis 16 I/O
1	0V	0V
2	24VDC	24VDC
3	Auxiliary function 1	Drive signal 1 Y
4	Auxiliary function 2	Drive signal 2 Y
5	Auxiliary function 3	Drive signal 3 Y
6	Auxiliary function 4	Drive signal 4 Y
7	Reference runs	Position reached Y
8		NC
9		Control enable Y
10		Tolerance zone Y

ST7/8	Analogue output (PID)
1	GND
2	Analogue – output, max. +/- 10V
3	PE protective earth

ST9	Power supply
1	GND
2	24VDC
3	Earth

MCC1	Analogue output /motor drive controller MCC
1	Control enable or CAN L (J1)
2	NC or CAN H (R1)
3	Encoder A
4	Encoder B
5	Encoder/ A
6	Encoder/ B
7	Target value analog
8	GND (0V)

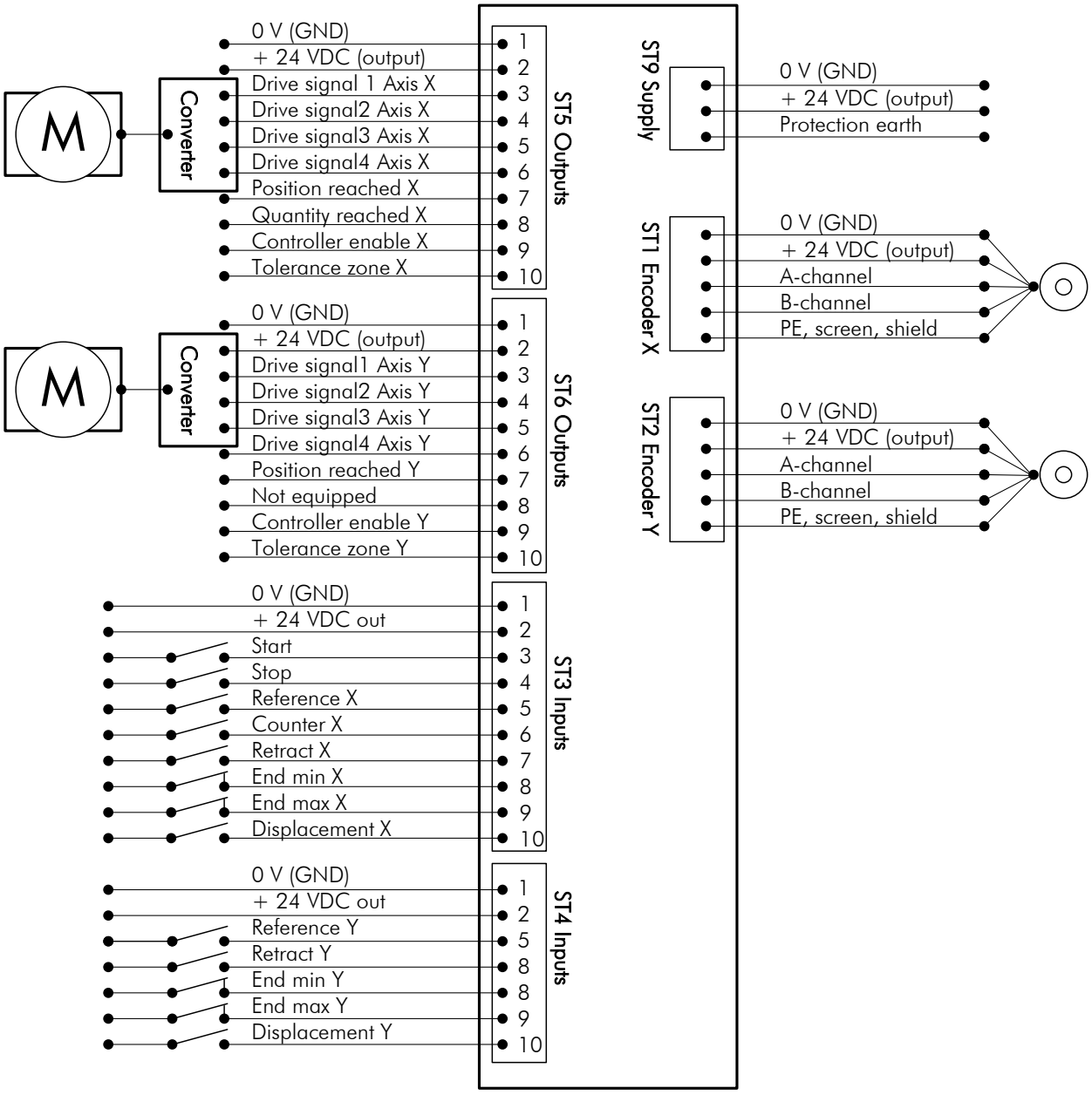
MCC2	Analogue output /motor drive controller
1	Control enable or CAN L (J2)
2	NC or CAN H (R2)
3	Encoder A
4	Encoder B
5	Encoder/ A
6	Encoder/ B
7	Target value analog
8	GND (0V)

S12	Programming Interface
1	GND
2	RS232 RX
3	RS232 TX
6	MD0
7	MD1
8	MD2

All clamps named GND (0V) and 24VDC, except the one at ST9 (power supply), are outputs!

NC = Not Connected

18.1 Connection Example



19 Disturbances

This chapter describes possible causes for disturbances and measures for their removal. In case of increased disturbances, please follow the measures for fault clearance in chapter 18.2.
In case of disturbances that cannot be eliminated by following the advice and the fault clearance measures given here, please contact the manufacturer (see second page of this document).

19.1 Fault Clearance

CAUTION!
The device, the connection line and the signal cable must not be installed next to sources of interference that emit strong inductive or capacitive interference or strong electrostatic fields.

External perturbations can be avoided thorough suitable cable routing.

The screen of the signal output cable should only be connected to the following circuit on one side. The screens should not be grounded on both sides. Signal cables always have to be routed separately from the load power line. A safety distance of at least 0,5 m has to be kept from inductive and capacitive sources of interference such as contactors, relays, motors, switching power supplies, clocked controllers etc!

If interferences occur in spite of all the items stated above being observed, please proceed as follows:

1. Installation of RC-circuits via contactor coils of AC-contactors (e.g. 0,1 µF / 100 Ω)
2. Installation of recovery diodes via DC-inductors
3. Installation of RC-circuits via the different motor phases (in the terminal box of the motor)
4. Do not connect protective earth and ground
5. Connect a mains filter ahead of the external power pack

19.2 Re-Start after Fault Clearance

After the fault clearance:

1. Reset the emergency stop mechanism if necessary
2. Reset the error report at the super-ordinate system if necessary.
3. Ensure that there are no persons in the danger area.

WARNING!
Danger of injury through non-conventional fault clearance!

Non-conventional fault clearance can lead to severe injuries and damage of property.

Therefore:

- Any work to clear the faults may only be performed by sufficiently qualified staff
- Arrange enough space before starting the works
- Make sure that the mounting area is clean and tidy. Loose components and tools are sources of accidents.

If components need to be replaced:

- Pay attention to a correct installation of the spare parts.
- Reinstall all the fixing elements properly
- Before turning on the device, ensure that all covers and safety equipment is installed correctly and functions properly

20 Accessory

Table 10 Accessory

Order description	Description	Article number
NG 13.0	Power supply Primary: 115/230 V AC Secondary: 24 V DC/600 mA	
	Relay output over separate relay card and connector cable possible	

21 Maintenance

The device is maintenance-free.

	WARNING! Danger through non-conventional maintenance! Non-conventional maintenance can lead to severe injuries and damage of property. Therefore: Maintenance works may only be completed by staff that has been authorized and trained by the operator.

22 Cleaning

	WARNING! The device can only be cleaned with a damp cloth, do not use aggressive cleanser!

23 Type Designation

P40 – XXX – 024 – XX – XX – CXXX

Positioning controller
Series P40

Version
000 = standard
001 = customized version
…

Supply Voltage
024 = 24VDC (+/- 20%)

Encoder Inputs (for each axis)
X = input is not available

1 = A, B, Z (PNP)	24V supply / 24V - 100 KHz
2 = A, A´, B, B´, Z, Z´	24V supply / 5V-TTL - 100 KHz
3 = A, A´, B, B´, Z, Z´	5V supply / 5V-TTL - 100 KHz
4 = one Analog Input	3,3V supply / 0..3,3V (12bit resolution)[1]
5 = two Analog Input	3,3V supply / 0..3,3V (12bit resolution)[2]
6 = A, B, Z (PNP)	24V supply / 24V - 100 KHz[3]
One analogue input	24V supply / 0..customer demand, max. 24V

Analog Outputs (for each axis)
X = analog output is not available
1 = analog output +/- 10V (PID regulated, 12bit release)[4]
2 = analog output +/- 10V (unregulated, 12bit release)

Options
X = further options are not available
C = screwing clamps
8 = 8 digital inputs / 8 digital outputs[5]
S = serial interface RS232
N = digital interface NPN

Note:
Digital outputs (transistor outputs, PNP) are available for each axis and can be selected freely by parameter configuration.
Index

[1] for special applications
[2] for special applications, analogue inputs only for and on plug 2. Axis
[3] for special applications and only possible for 2. Axis
[4] not possible with measuring system inputs "4" or "5"
[5] not possible for two axes and not possible with analogue output

24 Index

Abbreviation 5
Abbreviations 5
Accessory 64
Accident prevention regulations 5
Activation of the device 21
Causes of risk 8
Cleaning 65
Conventional use 9
Demounting 7
Diagnosis / Error Messages 50
Dimensions 12
Disposal 7
Disruption degree 13
Disruption degree 21
Disturbances 62
Error Messages 50
Explanation of symbols 6
Explanation of Symbols 6
Fault clearance 62, 63
First start-up 20
Function of keys 14
Function of Reference Drive 19
I/O Configuration 44, 47
Identification 12
Input function 44
Input logic 47
Installation 20
Maintenance 65
Manual Mode 16
Menu Axis 23
Menu Axis - Analog 30
Menu Axis - Distances 23
Menu Axis - Settings 33
Menu Axis - Times 28
Menu Contrast 51
Menu Password 49
Menu Structure, Sections and Parameters 22
Menu System 40
Menu System – Setup 40
Menu System – Times 43
Mounting / Installing 21
Operating Area 20
Operation Modes 16
Operational safety 5
Output function 46
Output logic 48
Packaging material 10
Positioning controller
Technical Data 12
Product features 11
Program Mode 18
Protection against contact 20
Protective equipment 8
Referencing 19
Safety 5, 8
Safety instructions 5
Safety rules 5
Single Mode 17
Special safety instructions 6
Start-up 20
Statement of warranties 7
Storage 10
Terminal Assignment 59
Terms 5
Transport 10
Transport damage 10
Type designation 12
Type Designation 66
Warning notes 6

Notizen:

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